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RESEARCH ARTICLE

STUDIES ON VARIABILITY OF MORPHOLOGICAL CHARACTERS ON JAMUN (SYZYGIUM CUMINII SKEELS) GENOTYPES GROWING IN NORTHERN BASTAR PLATEAU REGION OF CHHATTISGARH

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Abstract

Surveys were undertaken for characterization and evaluation of genetic diversity of Jamun (*Syzygiumcumini*Skeels) of seedling origin for different morphological characters of tree characters and leaf characters during 2016-17 and 2017-18 in the Jamun growing in Northern Bastar Plateau region of Chhattisgarh areas. Investigations were undertaken during the entire vegetative phase to assess the distribution, range and to record the range of genetic variability of different morphological traits on the selected sixty trees. Mature leaves were plucked and analyzed for different parameters such as leaf surface and leaf glands. Results of evaluated Jamun genotypes showed wide variability for studied characteristic.

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Introduction:-

Jamun possesses commercial importance as a minor fruit in tropical and subtropical conditions. It is a versatile fruit tree of best food and medicinal value. It is found throughout India up to an altitude of 1800 m and its habitat starts from Myanmar and extended to Afghanistan. This plant is also found in other countries like Thailand, Philippines, Madagascar etc. World production of jamun is estimated as 13.5 million tonnes out of which 15.4 % is contributed by India (Singh et al., 2011). India ranks second in production of jamun in the world. Maharashtra is the largest jamun producer followed by Uttar Pradesh, Tamil Nadu, Gujarat and Assam. Jamun (*Syzygiumcumini*Skeels or *Eugenia jambolana*) is an important underexploited indigenous fruit tree of India. It is a very common, large, evergreen beautiful tree of Indian sub-continent belongs to the Myrtaceae family. The tree is 8 m to 15 m tall, with oblong, opposite leaves that are smooth and glossy with a turpentine smell. Jamun has promising therapeutic value due to its various phyto-constituents and pharmacological properties. It is a good source of iron apart from being the source of other minerals, sugars and phytochemicals (Singh et al., 1967). The fruit is a rich source of anthocyanins, pectin, phenols and protein. Seed contains an alkaloid jambosin and a glycoside, jambolin or antimallin, which reduces or stop diastatic conversion of starch into sugars. The volatile oil from the jamun seeds can be extracted and used as an effective medicine against diabetes, heart and liver troubles. The antioxidant activity of jamun fruit has been attributed to its total phenolic compounds including anthocyanins. Glucose and fructose are the principal sugars in the ripe fruits, with no trace of sucrose. In recent years, jamun fruits are becoming popular due to their rich medicinal properties particularly for the 2 antidiabetic properties. The medicinal value is due to the presence of malic acid, oxalic acid, gallic acid and tannins. Jamun is a nutritious fruit tree with a variety of uses. The fully ripe fruits with subacid spicy flavour are eaten as fresh and can be processed into a variety of products like jam, jelly, squash, wine, vinegar and pickles. The foliage serves as fodder for cattle, twigs form good datoon and as rough

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painting brush. The timber is used for buildings, agricultural implements and railway sleepers. The jamun fruit demand is increasing day by day because of its nutritive value and that will require selected plants of superior quality with high yield potential. As majority of jamun trees are of seedling origin, they show tremendous variation in their morphology and physicochemical attributes. Lack of improved high yielding varieties with dwarf stature and good keeping quality are the major bottlenecks for the commercial cultivation of jamun in India. Considering the above facts, the present study entitled “Variability in quantitative characters of jamun (*Syzygiumcumini* Skeels) genotypes” was undertaken with the objective to evaluate the quantitative characters of jamun genotypes for identifying the superior types.

Material And Methods:-

This study was carried out at the Northern Bastar Plateau Region of Chhattisgarh and the collected genotypes were analyzed in the quality laboratory of the Department of Horticulture, College of Horticulture and Research Station, Kanker, IGKV, Raipur, Chhattisgarh during February to July of 2016-17 and 2017-18. Sixty promising genotypes of 8 to 15 year jamun tree were collected. Visual observation was initiated for the tree and leaf characters which are described in Minimal descriptors of jamun in NBPGR, 2002. Leaf surface and leaf glands were visualized in fully mature leaves were determined by following standard procedures.

Results And Discussions:-

The data pertaining to morphological characters of jamun genotypes showed significant difference and a high degree of variability for all the characters studied (Table 1).

Tree habit of all sixty genotypes of jamun was divided into three groups viz., upright, spreading and drooping. Out of the 60 genotypes, 19 genotypes namely CGJAM-1, CGJAM-2, CGJAM-6, CGJAM-8, CGJAM-11, CGJAM-12, CGJAM-13, CGJAM-16, CGJAM-18, CGJAM-19, CGJAM-23, CGJAM-27, CGJAM-37, CGJAM-44, CGJAM-46, CGJAM-47, CGJAM-48, CGJAM-51 and CGJAM-59 had upright whereas, 7 genotypes namely CGJAM-7, CGJAM-26, CGJAM-36, CGJAM-45, CGJAM-54, CGJAM-55 and CGJAM-60 had drooping and remaining 34 genotypes have spreading growth habit. The highest frequency of tree habit was observed in spreading category with 56.66% followed by upright 31.66% and lowest was noted in drooping with 11.67%. Bark colour of all sixty genotypes of jamun was categorized into three groups viz., light grey, grey and brown. Out of the 60 genotypes, 28 genotypes namely CGJAM-1, CGJAM-2, CGJAM-3, CGJAM-6, CGJAM-7, CGJAM-8, CGJAM-11, CGJAM-14, CGJAM-15, CGJAM-18, CGJAM-21, CGJAM-23, CGJAM-24, CGJAM-26, CGJAM-28, CGJAM-38, CGJAM-39, CGJAM-40, CGJAM-41, CGJAM-42, CGJAM-43, CGJAM-44, CGJAM-49, CGJAM-51, CGJAM-52, CGJAM-53, CGJAM-54 and CGJAM-55 had light grey while, 3 genotypes namely CGJAM-35, CGJAM-37 and CGJAM-56 had brown and remaining 29 genotypes have grey bark colour. Maximum frequency of bark colour was observed in grey (48.33%), followed by light grey (46.66%) and brown (5%). Trunk wood colour of all sixty jamun genotypes was splitted into four group's viz., reddish grey, brownish grey, dull brownish and brownish red. Out of the 60 genotypes, 10 genotypes namely CGJAM-4, CGJAM-5, CGJAM-9, CGJAM-10, CGJAM-13, CGJAM-20, CGJAM-23, CGJAM-24, CGJAM-28 and CGJAM-54 had brownish grey while, 12 genotypes namely CGJAM-6, CGJAM-8, CGJAM-11, CGJAM-12, CGJAM-18, CGJAM-27, CGJAM-29, CGJAM-33, CGJAM-34, CGJAM-45, CGJAM-46 and CGJAM-58 had dull brownish whereas, 4 genotypes namely, CGJAM-35, CGJAM-36, CGJAM-37 and CGJAM-56 had brownish red and remaining 34 genotypes had reddish grey trunk wood colour. The maximum frequency of trunk wood colour of tree was noted in reddish grey category with 56.66% and minimum was recorded in brownish red with 6.67%. Shape of leaf of all sixty genotypes of jamun was categorized into four groups viz., broadly ovate, elliptic oblong, elliptic and lanceolate. Out of the 60 genotypes, 14 genotypes namely CGJAM-1, CGJAM-3, CGJAM-5, CGJAM-13, CGJAM-17, CGJAM-21, CGJAM-25, CGJAM-30, CGJAM-44, CGJAM-48, CGJAM-50, CGJAM-53, CGJAM-55 and CGJAM-56 had lanceolate while, 12 genotypes namely CGJAM-4, CGJAM-8, CGJAM-33, CGJAM-34, CGJAM-35, CGJAM-36, CGJAM-37, CGJAM-38, CGJAM-42, CGJAM-43, CGJAM-47 and CGJAM-54 had elliptic whereas, 10 genotypes namely CGJAM-2, CGJAM-12, CGJAM-20, CGJAM-23, CGJAM-29, CGJAM-32, CGJAM-40, CGJAM-41, CGJAM-46 and CGJAM-60 had elliptic oblong and remaining 24 genotypes had broadly ovate leaf shape. Maximum frequency of leaf shape was observed in broadly ovate category with 40% whereas, minimum was noticed in elliptic oblong with 16.67%. Leaf glands of all sixty genotypes of jamun were recorded in mature leaves and depending on the presence of glands it was categorized into two groups present and absent. Out of the 60 genotypes, 17 genotypes namely CGJAM-4, CGJAM-9, CGJAM-13, CGJAM-20, CGJAM-23, CGJAM-29, CGJAM-33, CGJAM-34, CGJAM-35, CGJAM-36, CGJAM-37, CGJAM-38, CGJAM-42, CGJAM-43, CGJAM-46, CGJAM-47 and CGJAM-54 showed absence of leaf glands

and remaining 43 genotypes had found presence of leaf glands. Maximum frequency of leaves glands was noted in presence of glands category with 71.66% and minimum was confined in the absence of leaves glands with 28.33%.

Leaf surface of all sixty genotypes of jamun were recorded in mature leaves which resembling the texture of leather and categorized into coriaceous and Mild coriaceous. Out of the 60 genotypes, 28 genotypes namely CGJAM-1, CGJAM-2, CGJAM-3, CGJAM-5, CGJAM-6, CGJAM-7, CGJAM-8, CGJAM-10, CGJAM-11, CGJAM-14, CGJAM-16, CGJAM-18, CGJAM-19, CGJAM-24, CGJAM-27, CGJAM-28, CGJAM-29, CGJAM-30, CGJAM-32, CGJAM-39, CGJAM-40, CGJAM-41, CGJAM-45, CGJAM-48, CGJAM-49, CGJAM-50, CGJAM-56 and CGJAM-60 had coriaceous and remaining 32 genotypes had mild coriaceous formed of leaf texture. The highest frequency of leaves was noted in mild coriaceous category with 53.33% and minimum was showed in coriaceous (46.67%) category.

The morphological characteristics of tree and leaves are the important aspects for a fruit breeder. The existence of various tree habits, bark colour, leaf shape, leaf glands and leaf surface represent the extreme scale of variation existing in the land races collection under study (Table 1). The existence of variations in morphological characters has been reported by several workers in Jamun by Daware (1981), Inamdaret al. (2002) and Laxmikanth (2004) and other crops such as mango by Iyeret al., 1988. This morphological variation needs to be exploited for crop improvement. Daware (1981), Inamdaret al. (2002), Prabhuraj (2002a) and Laxmikanth (2004) while working on tree habit found that oval and round type of canopy, but noted that majority are with round tree habit. In the present study maximum tree habit was noted as spreading in 34 genotypes, upright in 19 genotypes and drooping in 7 genotypes (Table 4.1). Similarly, Orwa, et al, 2009 reported that maximum tree of jamun are of grey or light grey, thickness of 2.5 cm and fairly smooth bark, leaf with broadly ovate, glabrous and coriaceous which on mature leaves developed leathery surface. The present outcome revealed that maximum genotypes (29) observed were has grey bark colour followed by light grey (28) while, 43 genotypes reported presence of glands on which glabrous in appearance and 32 genotypes found mild coriaceous surface followed by coriaceous in 28 genotypes under study.

Table 1:- Morphological characters of tree habit and leaf parameters of different jamun genotypes.

Sl. No.	Tree habit	Bark colour	Trunk wood colour	Leaf shape	Leaf glands	Leaf surface
CGJAM- 1	Upright	Light grey	Reddish grey	Lanceolate	Present	Coriaceous
CGJAM- 2	Upright	Light grey	Reddish grey	Elliptic oblong	Present	Coriaceous
CGJAM- 3	Spreading	Light grey	Reddish grey	Lanceolate	Present	Coriaceous
CGJAM- 4	Spreading	Grey	Brownish grey	Elliptic	Absent	Mild coriaceous
CGJAM- 5	Spreading	Grey	Brownish grey	Lanceolate	Present	Coriaceous
CGJAM- 6	Upright	Light grey	Dull brownish	Broadly ovate	Present	Coriaceous
CGJAM- 7	Drooping	Light grey	Reddish grey	Broadly ovate	Present	Coriaceous
CGJAM- 8	Upright	Light grey	Dull brownish	Broadly ovate	Present	Coriaceous
CGJAM- 9	Spreading	Grey	Brownish grey	Elliptic	Absent	Mild coriaceous
CGJAM- 10	Spreading	Grey	Brownish grey	Broadly ovate	Present	Coriaceous
CGJAM- 11	Upright	Light grey	Dull brownish	Broadly ovate	Present	Coriaceous
CGJAM- 12	Upright	Grey	Dull brownish	Elliptic oblong	Present	Mild coriaceous
CGJAM- 13	Upright	Grey	Brownish grey	Lanceolate	Absent	Mild coriaceous
CGJAM- 14	Spreading	Light grey	Reddish grey	Broadly ovate	Present	Coriaceous
CGJAM- 15	Spreading	Light grey	Reddish grey	Broadly ovate	Present	Mild coriaceous
CGJAM- 16	Upright	Grey	Reddish grey	Broadly ovate	Present	Coriaceous
CGJAM- 17	Spreading	Grey	Reddish grey	Lanceolate	Present	Mild coriaceous
CGJAM- 18	Upright	Light grey	Dull brownish	Broadly ovate	Present	Coriaceous
CGJAM- 19	Upright	Grey	Reddish grey	Broadly ovate	Present	Coriaceous
CGJAM- 20	Spreading	Grey	Brownish grey	Elliptic oblong	Absent	Mild coriaceous
CGJAM- 21	Spreading	Light grey	Reddish grey	Lanceolate	Present	Mild coriaceous
CGJAM- 22	Spreading	Grey	Reddish grey	Broadly ovate	Present	Mild coriaceous
CGJAM- 23	Upright	Light grey	Brownish grey	Elliptic oblong	Absent	Mild coriaceous
CGJAM- 24	Spreading	Light grey	Brownish grey	Broadly ovate	Present	Coriaceous
CGJAM- 25	Spreading	Grey	Reddish grey	Lanceolate	Present	Mild coriaceous
CGJAM- 26	Drooping	Light grey	Reddish grey	Broadly ovate	Present	Mild coriaceous

CGJAM- 27	Upright	Grey	Dull brownish	Broadly ovate	Present	Coriaceous
CGJAM- 28	Spreading	Light grey	Brownish grey	Broadly ovate	Present	Coriaceous
CGJAM- 29	Spreading	Grey	Dull brownish	Elliptic oblong	Absent	Coriaceous
CGJAM- 30	Spreading	Grey	Reddish grey	Lanceolate	Present	Coriaceous
CGJAM- 31	Spreading	Grey	Reddish grey	Broadly ovate	Present	Mild coriaceous
CGJAM- 32	Spreading	Grey	Reddish grey	Elliptic oblong	Present	Coriaceous
CGJAM- 33	Spreading	Grey	Dull brownish	Elliptic	Absent	Mild coriaceous
CGJAM- 34	Spreading	Grey	Dull brownish	Elliptic	Absent	Mild coriaceous
CGJAM- 35	Upright	Brown	Brownish red	Elliptic	Absent	Mild coriaceous
CGJAM- 36	Drooping	Grey	Brownish red	Elliptic	Absent	Mild coriaceous
CGJAM- 37	Upright	Brown	Brownish red	Elliptic	Absent	Mild coriaceous
CGJAM- 38	Spreading	Light grey	Reddish grey	Elliptic	Absent	Mild coriaceous
CGJAM- 39	Spreading	Light grey	Reddish grey	Broadly ovate	Present	Coriaceous
CGJAM- 40	Spreading	Light grey	Reddish grey	Elliptic oblong	Present	Coriaceous
CGJAM- 41	Spreading	Light grey	Reddish grey	Elliptic oblong	Present	Coriaceous
CGJAM- 42	Spreading	Light grey	Reddish grey	Elliptic	Absent	Mild coriaceous
CGJAM- 43	Spreading	Light grey	Reddish grey	Elliptic	Absent	Mild coriaceous
CGJAM- 44	Upright	Light grey	Reddish grey	Lanceolate	Present	Mild coriaceous
CGJAM- 45	Drooping	Grey	Dull brownish	Broadly ovate	Present	Coriaceous
CGJAM- 46	Upright	Grey	Dull brownish	Elliptic oblong	Absent	Mild coriaceous
CGJAM- 47	Upright	Grey	Reddish grey	Elliptic	Absent	Mild coriaceous
CGJAM- 48	Upright	Grey	Reddish grey	Lanceolate	Present	Coriaceous
CGJAM- 49	Spreading	Light grey	Reddish grey	Broadly ovate	Present	Coriaceous
CGJAM- 50	Spreading	Grey	Reddish grey	Lanceolate	Present	Coriaceous
CGJAM- 51	Upright	Light grey	Reddish grey	Broadly ovate	Present	Mild coriaceous
CGJAM- 52	Spreading	Light grey	Reddish grey	Broadly ovate	Present	Mild coriaceous
CGJAM- 53	Spreading	Light grey	Reddish grey	Lanceolate	Present	Mild coriaceous
CGJAM- 54	Drooping	Light grey	Brownish grey	Elliptic	Absent	Mild coriaceous
CGJAM- 55	Drooping	Light grey	Reddish grey	Lanceolate	Present	Mild coriaceous
CGJAM- 56	Spreading	Brown	Brownish red	Lanceolate	Present	Coriaceous
CGJAM- 57	Spreading	Grey	Reddish grey	Broadly ovate	Present	Mild coriaceous
CGJAM- 58	Spreading	Grey	Dull brownish	Broadly ovate	Present	Mild coriaceous
CGJAM- 59	Upright	Grey	Reddish grey	Broadly ovate	Present	Mild coriaceous
CGJAM- 60	Drooping	Grey	Reddish grey	Elliptic oblong	Present	Coriaceous

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